

NON-PUBLIC?: N
ACCESSION #: 9209110112
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Byron, Unit 2 PAGE: 1 OF 04

DOCKET NUMBER: 05000455

TITLE: Unit 2 Reactor Trip
EVENT DATE: 06/10/92 LER #: 92-003-01 REPORT DATE: 08/28/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: W. Sheffler, Technical Staff TELEPHONE: (815) 234-5441
Engineer, Ext. 2378

W. Kouba, U2 Operating Engineer,
Ext. 2218

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: JB COMPONENT: FCV MANUFACTURER: F130
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 06/10/92, at 1315, a Feedwater (FW) JB! alarm (Steam Generator (S/G) 2C Level Deviation-Low) was received on the "C" loop steam generator. Initial attempts to stabilize steam generator level were successful, however, the 2FW530 ("C" loop Steam Generator Feedwater Regulating Valve) subsequently failed closed, and a manual reactor trip was initiated at 1325. All rods inserted and all systems functioned normally. In addition to the reactor trip, the Auxiliary Feedwater pumps Auto-started on Low-2 Steam generator level. Steam generator level was recovered to normal via the Auxiliary Feedwater system.

The cause of this event was the failure of the valve operator diaphragm. This led to instantaneous loss of air pressure and immediate

closure of the 2FW530 valve.

All Unit two feedwater regulating valve diaphragms were replaced based upon an external inspection of the diaphragm. Additionally the diaphragm casing torque value was increased per vendor recommendations.

This event is reportable per 10CFR50.73(a)(2)(iv), any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System.

(0955R/VS-2)

END OF ABSTRACT

TEXT PAGE 2 OF 4

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 06/10/92 / 1325

Unit 1 MODE 1 - Power Operation Rx Power 100%
RCS AB! Temperature/Pressure NOT / NOP

Unit 2 MODE 2 - Startup Rx Power 100%
RCS AB! Temperature/Pressure NOT / NOP

B. DESCRIPTION OF EVENT:

At 1315, on 06/10/92, a Feedwater (FW) JB! alarm (Steam Generator (S/G) 2, C Level Deviation-Low) was received on the "C" loop steam generator. The Nuclear Station Operator (NSO) placed the 2FW530 Main Feedwater regulating valve in manual in order to increase FW flow and dispatched an equipment attendant (EA) to investigate locally. The EA reported an air leak from the valve operator diaphragm. At 1324, the NSO placed the FW pump Master Speed Controller (2SC-509A) in manual to increase the FW header pressure to force more flow through the partially open 2FW530 valve. At 1325, a load drop of 5 MW/minute was initiated to allow for closure of the 2FW530 valve at 20% Reactor power, but the 2FW530 valve failed full closed causing the loss of FW flow and subsequent rapid decrease in S/G 2C level. A manual reactor trip was initiated and Byron Emergency Procedure BEP-0 was entered. All rods inserted and all systems functioned normally. In addition to the manual reactor trip which caused a Feedwater Isolation, the Auxiliary Feedwater pumps auto-started on Low-2 Steam generator level. Steam generator level was restored to normal via the Auxiliary Feedwater system.

A review of the steam generator level trace, after the event by the root cause investigation team, showed a slight change in pattern approximately 2 hours prior to the event. It is postulated that this may have been the start of the diaphragm failure. This change was noted by the operator but was deemed to be within the normal variances seen in daily feedwater regulating valve control.

This event is reportable in accordance with 10CFR50.73(a)(2)(iv), any event or condition that results in manual or automatic actuation of any Engineered Safety Feature.

C. CAUSE OF EVENT:

The root cause of the 2FW530 regulating valve closure was the failure of the operator diaphragm due to bolt hole elongation with insufficient clamping forces on the diaphragm in the diaphragm casing. The failure of the diaphragm along a "5 bolt length" section caused an 8 inch by one-half inch crescent-shaped piece of the diaphragm to separate at the five bolt holes. The diaphragm then blew inward and tore radially which led to complete instantaneous loss of air pressure and immediate closure of the 2FW530 valve, which is a "fail closed" valve. The insufficient clamping force may have been due to insufficient torquing of the bonnet bolts and/or the use of a Room Temperature Vulcanization (RTV) sealant on the sealing surface of the diaphragm. The RTV used was Permatex 6B. The Permatex was applied by a Mechanical Maintenance worker to prevent air leakage from the bonnet which was beyond the work instructions for the repair.

(0955R/VS-3)

TEXT PAGE 3 OF 4

C. CAUSE OF EVENT: (continued)

The diaphragm was sent to System Materials Analysis Department (SMAD) for analysis. The failure of the diaphragm was due to fatigue failure as opposed to transient failure. The differences in shear capability between the diaphragm material (Buna-N) and the Permatex, due to different coefficients of friction, may have allowed the diaphragm to move slightly during normal operation of the 2FW530 valve. The movement may have caused a loss of clamping forces on the diaphragm, which then tore away from the bolt holes in the diaphragm. Additionally, the torque value of 20 ft.-lbs., specified by the vendor manual, may have been inadequate to ensure

proper clamping forces. The specified torque value is currently being reviewed by the vendor (Fisher).

D. SAFETY ANALYSIS:

All safeguard equipment functioned as designed which resulted in maintaining the Reactor in a safe condition throughout the event. The 2C S/G Lo-2 Level caused an Auxiliary Feedwater initiation, as designed, on a loss of main feedwater to maintain the secondary heat sink. The safety significance would be the same if the same events occurred under any different initial conditions.

E. CORRECTIVE ACTIONS:

A root cause investigation team (HPES 92-08) was immediately established to review the following items:

- 1). Impact on Unit One FW regulating valve operation.
- 2). Root cause and corrective actions required for Unit Two startup.
- 3). Performing a material analysis on the ruptured diaphragm.
- 4). Obtaining engineering assistance/recommendations.
- 5). Obtaining vendor (Fisher) recommendations with respect to proper torque values and the use of Permatex as a sealant.

The 2FW530 regulating valve diaphragm was replaced along with the other three Unit Two regulating valve diaphragms based on an external inspection of the diaphragms which indicated the presence of Permatex.

In addition, the vendor (Fisher) recommended increasing the diaphragm casing torque from 20 to 40 foot pounds, which was done on all four Unit Two Feedwater regulating valves. The Unit One Feedwater regulating valves were also inspected. There was no Permatex sealant found on the edge of the exposed diaphragm. No increase in torque value was deemed necessary. The vendor is reviewing the torque values specified. When the results of this review are received, Byron will review and take corrective actions as required for Unit 1 and Unit 2. This will be tracked by NTS #4552009202600-01.

Some examples of the effects of performing work outside the work

instructions will be reviewed with all maintenance departments. Additionally, current work instruction adherence policies will be reviewed with maintenance supervisors who will be informed of the need to enforce these adherence policies. (NTS #455-399-92-92008-01)

(0955R/VS-4)

TEXT PAGE 4 OF 4

E. CORRECTIVE ACTIONS: (continued)

Nuclear Work Requests #B94227, B94228, B94229 and B94230 were written to replace all four Unit 1 FW Regulating Valves actuator diaphragms during the next refueling outage scheduled in January 1993.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

a) EVENT SEARCH (DIR, LER)

This is the first diaphragm failure recorded on these valves. Previous corrective action to prevent diaphragm failure occurred during Unit 1 refueling outage B1R04, when an inspection showed a leaky diaphragm that had become "hardened".

This indication resulted in all four diaphragm changeouts on Unit One during B1R04 in September 1991; and the subsequent change out of all four Unit Two diaphragms during B2R03 in March, 1992. Of the eight diaphragms changed out, only the first diaphragm (1FW510), showed any signs of degradation.

b) INDUSTRY SEARCH (OPEX's NPRDS)

O&MR 386 Reactor Transients Resulting from Feedwater Regulating Bypass Valve Problems.

c) NWR

2FW510 B93608 and B93717
2FW520 B93610 and B93718
2FW530 B93594 and B93719
2FW540 B93609 and B93720

d) ANALYSIS

None

G. COMPONENT FAILURE DATA:

MODEL MFG PART
MANUFACTURER NOMENCLATURE NUMBER NUMBER

Fisher Controls 16" AOV Flow SS-137 ENA Type 80
Control Valve

(0955R/VS-5)

ATTACHMENT 1 TO 9209110112 PAGE 1 OF 2

Commonwealth Edison
Byron Nuclear Station
4450 North German Church Road
Byron, Illinois 61010

August 28, 1992

Ltr: BYRON 92-0574

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Dear Sir:

The enclosed Licensee Event Report from Byron Generating Station is being transmitted to you as a Supplemental Report.

This report is number 92-003; Docket No. 50-455.

Sincerely,

R. Pleniewicz
Station Manager
Byron Nuclear Power Station

RP/CW/mw

Enclosure: Licensee Event Report No. 92-003

cc: A. Bert Davis, NRC Region III Administrator
W. Kropp, NRC Senior Resident Inspector

INPO Record Center
CECo Distribution List

(0955R/VS)

ATTACHMENT 1 TO 9209110112 PAGE 2 OF 2

Section #06-02-92-026, "Supplement to Investigation Report" omitted.

*** END OF DOCUMENT ***
